PROBLEM 2: PUBLIC TRANSPORTATION

Before you go to college, your family is planning to take a family vacation to the Grand Canyon. To save wear and tear on your family car, your parents decide to rent a car for the trip. U-Rent has two options for renting cars. For Option A, you must pay $15.00 per day and $0.15 per mile. For Option B, you must pay a flat fee of $49.95 per day.

A. On a map, locate your hometown and the Grand Canyon. Estimate the distance between your hometown and the Grand Canyon. How many miles do you estimate you will travel on the round trip?

B. Write an expression for the cost of renting a car under Option A. Define any variables you use.

C. Write an expression for the cost of renting a car under Option B. Define any variables you use.

D. Write an equation that can be used to determine when the cost of Option A is equal to the cost of Option B.

E. How many days will you have to travel until both plans cost the same amount?

F. Which plan should you choose? Justify your reasoning.

ONE SOLUTION TO PROBLEM 2: PUBLIC TRANSPORTATION

A. On a map, locate your hometown and the Grand Canyon. Estimate the distance between your hometown and the Grand Canyon. How many miles do you estimate you will travel on the round trip?

Answers vary. For the purpose of this solution, assume that the round trip is 1500 miles.

B. Write an expression for the cost of renting a car under Option A. Define any variables you use.

If we let X represent the number of days traveled, then the expression for the cost of a car under Option A is $15X + .15(1500)$.

C. Write an expression for the cost of renting a car under Option B. Define any variables you use.

Again letting X represent the number of days traveled, the expression for the cost of a car under Option B is $49.95X$.

D. Write an equation that can be used to determine when the cost of Option A is equal to the cost of Option B.

All we need do is set the two expressions equal. We have

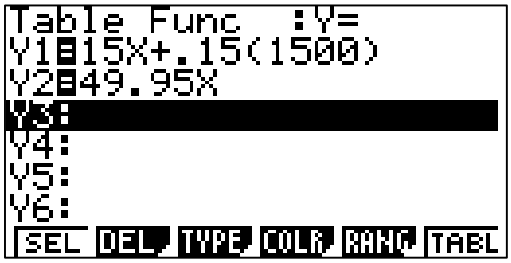
$$15X + .15(1500) = 49.95X$$

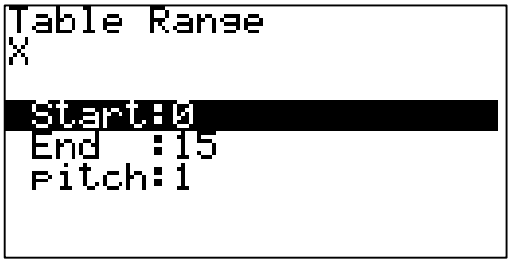
E. How many days will you have to travel until both plans cost the same amount?

There are many ways to solve this. One method is with a table. From the MAIN MENU, call up the "Table" function.

- For Y1, type in $15X + .15(1500)$. Press [EXE] .
- For Y2, type in $49.95X$ and press [EXE] .
- Delete any other functions there by highlighting them and pressing [F2] followed by [F1] . See below left.

- Next, press [F5] so we can set the range. One possible set of values is shown below right. Press [EXE] after each new value you type. See below right. Press [EXIT] when finished.





- Press [F6] to see the table.

Students should note that Option A is less expensive for a trip lasting from 0 to 6 days, but that Option B is less expensive for any trip lasting 7 or more days. Since the cost will most likely be charged on a whole day basis, with partial days counting as whole days, this should help students determine which plan to select. Other students may choose the “Equation Solver” or the “Graph” features of the calculator to arrive at a solution of 6.4. Nevertheless, since rental car companies usually don't calculate costs for portions of a day, students realize that the plans will never cost the same, that their decision should be based on whether the trip will last seven or more days.

F. Which plan should you choose? Justify your reasoning.

Answers will vary as the mileage from your students' hometown to the Grand Canyon and the number of days suggested for the trip will differ.